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CTCGAGGACAGTGACCTGGGAGTGAGTACAAGGTGAGGCCACCACTCAGGGT
GCCAGCTCCAAGCGGGTCACAGGGACGAGGGCTGCGGCCATCAGGAGGCCCT
GCACACACATCTGGGACACGCGCCCCCGAGGGCCAGTTCACCTCAGTGCGCC
TCATTCTCCTGCACAAAAGCGCCCCCATCCTTTCTTCACAAGGCTTTCGTGG
AAGCAGAGGCGTCGATGCCCAGTACCCTCTCCCTTTCCCAGGCAACGGGACC
CCAAGTTTGCTGACTGGGACCACCAAGCCACGCATGCGTCAAGAGTGAGAGT
CCGGGACCTAGGCAGGGGCCCTGGGGTTGGGCCTGAGAGAGAAGAGAACCTC
CCCCAGCACTCGGTGTGCATCGGTAGTGAAGGAGCCTCACCTGACCCCCGCT
GTTGCTCAATCGACTTCCCAAGAACAGAGAGAAAAGGGAACTTCCAGGGCGG
CCCGGGCCTCCTGGGGGTTCACACCCCATTTTCTAGCTGAAAGCACTGAGGCA
GAGCTCCCCCTACCCAGGCTCCACTGCCCCGGCACAGAAATAACAACCACGGT
TACTGATCATCTGGGAGCTGTCCAGGAATTC

FIG._1A

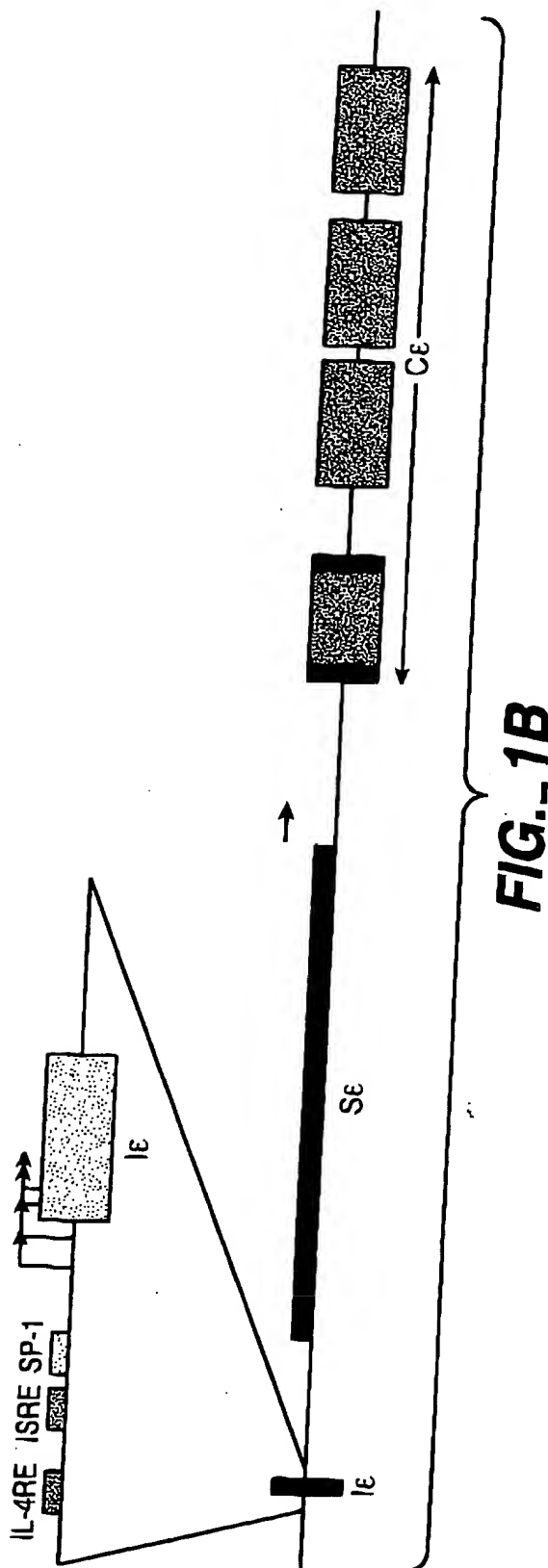
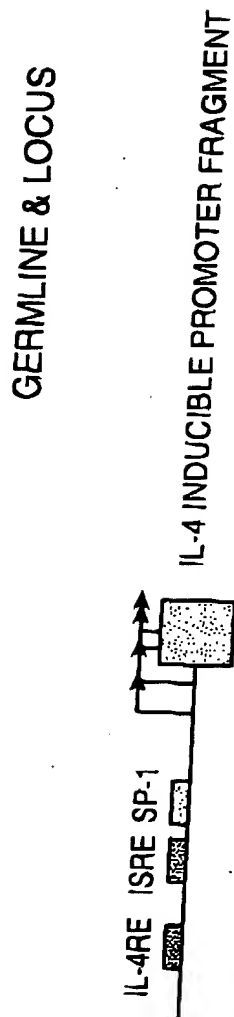
1 GCTGGGCTAA ACTGGGCTAG CCTGAGCTGG GCTGAACTGG GCTGCTGGGC
51 TGGACTGGGT AAGCTGGGCT GAGCTGGGTT GGGTGGAAAT GGGCTGAGCT
101 GAGCTAGGCT AACTGGGTT TGGCTGGGCT GGGCTGGGCT GGG

FIG._2B

1 GGTTTGGCTG GGCTGGGCTG GGCTGGGCTG GGTTTCAGCTG AGCGGGTTGG
51 GTTAGACTGG GTCAAAGTGG TTCAGC

FIG._2C

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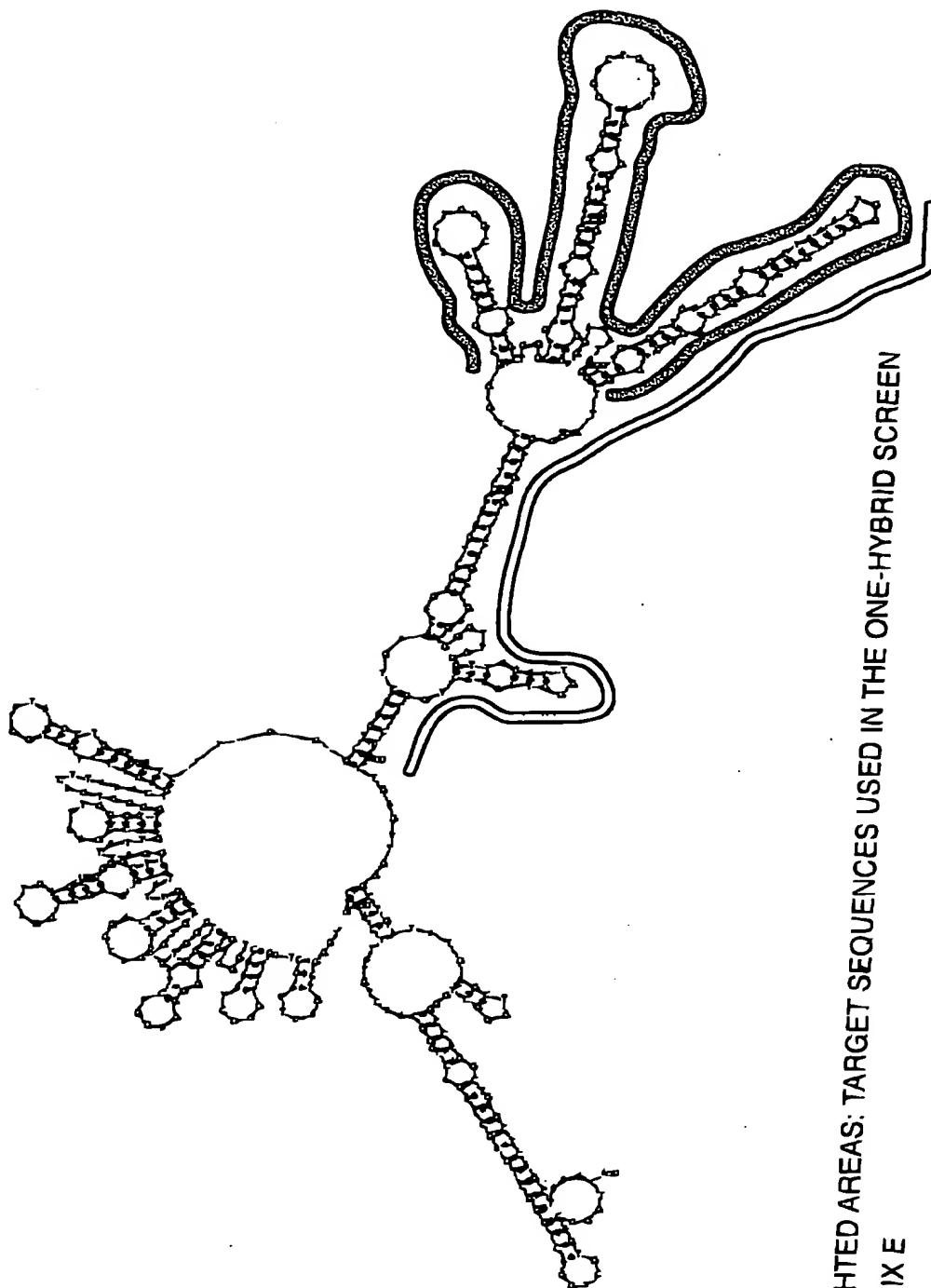
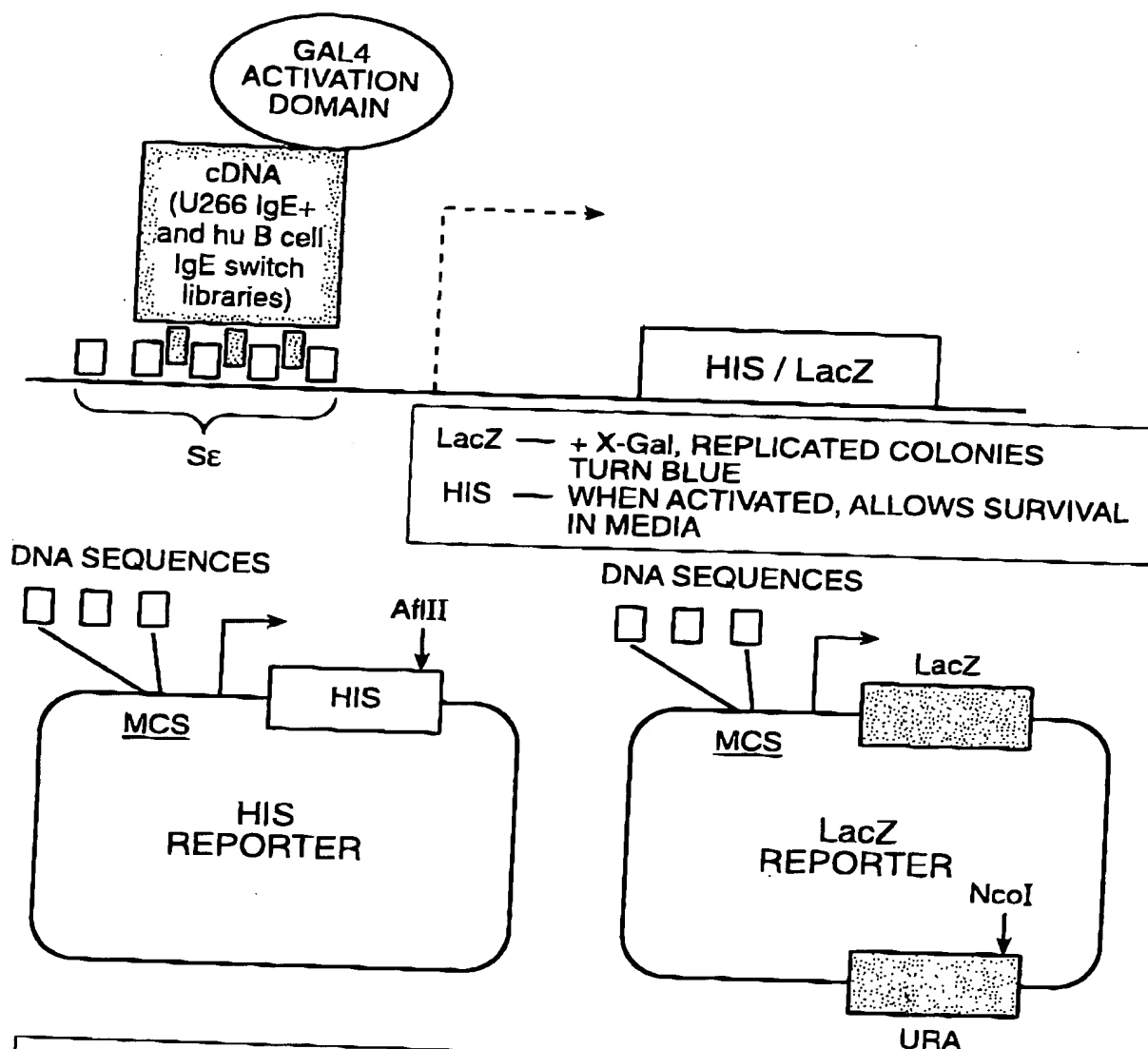
LOW ENERGY DNA FOLDING OF THE S ϵ REGIONHIGHLIGHTED AREAS: TARGET SEQUENCES USED IN THE ONE-HYBRID SCREEN
APPENDIX E

FIG. 2A

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YEAST ONE-HYBRID SCREENING



ONE HYBRID REPORTER VECTORS
 DNA SEQUENCES OF INTEREST ARE INSERTED INTO THE MULTIPLE CLONING SITES (MCS).
 THE ENZYME USED TO LINEARIZE THE VECTOR IS SHOWN WITH A SOLID ARROW.
 DASHED ARROWS INDICATE THE TRANSCRIPTION OF THE REPORTER GENE.

APPENDIX F

FIG. 3

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IL-4 INDUCTION OF GERMLINE ϵ mRNA IN THE
IgM + B CELL LINES: CA-46, MC-116 AND DND39

DND39 + IL-4

DND39 - IL-4

MC-116 + IL-4

MC-116 - IL-4

CA-46 + IL-4

CA-46 - IL-4

NEG. CONT.

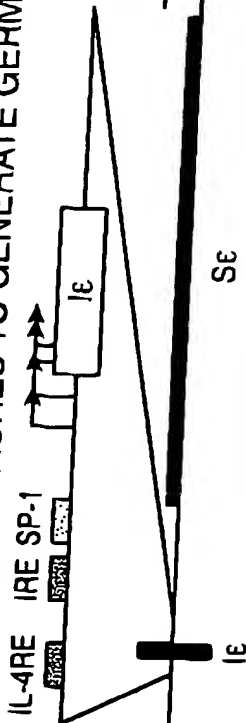


CELLS WERE INCUBATED FOR 48 HRS. IN 300 U / ml OF h-IL-4.
RT-PCR WAS PERFORMED USING PRIMERS SPECIFIC FOR THE GERMLINE
 ϵ EXON AND THE 5'-END OF THE C ϵ CH1 EXON (PREDICTED SIZE ~ 200 bp).

APPENDIX G

FIG. 4

APPROACHES TO GENERATE GERMLINE ϵ PROMOTER KNOCK-IN REPORTER CELL LINES



IL-4 INDUCIBLE, IgM+ B CELL LINES ARE TRANSFECTED. UNDER THE INFLUENCE OF IL-4, GFP AND / OR BFP POSITIVE CLONES ARE ISOLATED BY FACS. HOMOLOGOUS RECOMBINATION CAN BE CONFIRMED BY PCR AND/OR SOUTHERN BLOT HYBRIDIZATION.

IL-4 INDUCIBLE, IgM+ B CELL LINES ARE TRANSFECTED AND SELECTED WITH G418. SURVIVORS ARE SORTED FOR THE LACK OF 3' BFP EXPRESSION (DELETED DURING HOMOLOGOUS RECOMBINATION). RT-PCR IS PERFORMED TO CONFIRM HOMOLOGOUS RECOMBINATION. THOSE CLONES ARE TRANSFECTED WITH *cre* TO REMOVE THE NEOMYCIN RESISTANCE GENE.

FIG. 5A

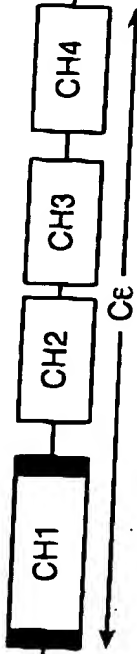


FIG. 5B

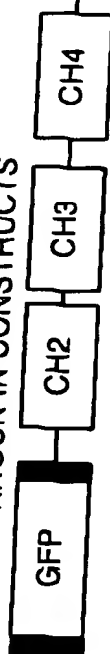
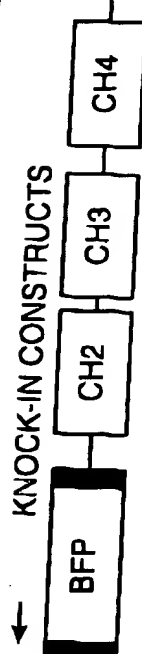


FIG. 5C



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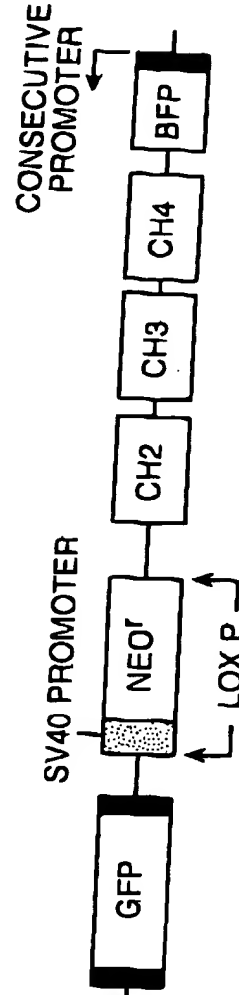


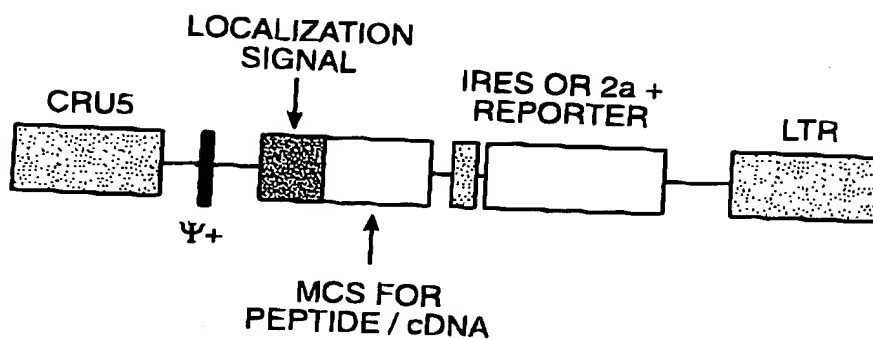
FIG. 5D

IL-4 RE, IL-4 RESPONSIVE ELEMENT
IRE, INTERFERON RESPONSIVE ELEMENT
SP-1, SP-1 BINDING SITE
Iε, NON-TRANSLATED EXON
Sε, SWITCH REGION OF ϵ
GFP, GREEN FLUORESCENT PROTEIN
BFP, BLUE FLUORESCENT PROTEIN
CH 1, 2, 3, 4, CONSTANT REGION DOMAIN EXONS

APPENDIX A

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RIGEL BASE VECTOR



ALL COMPONENTS ARE UNIQUELY CASSETTED FOR FLEXIBILITY

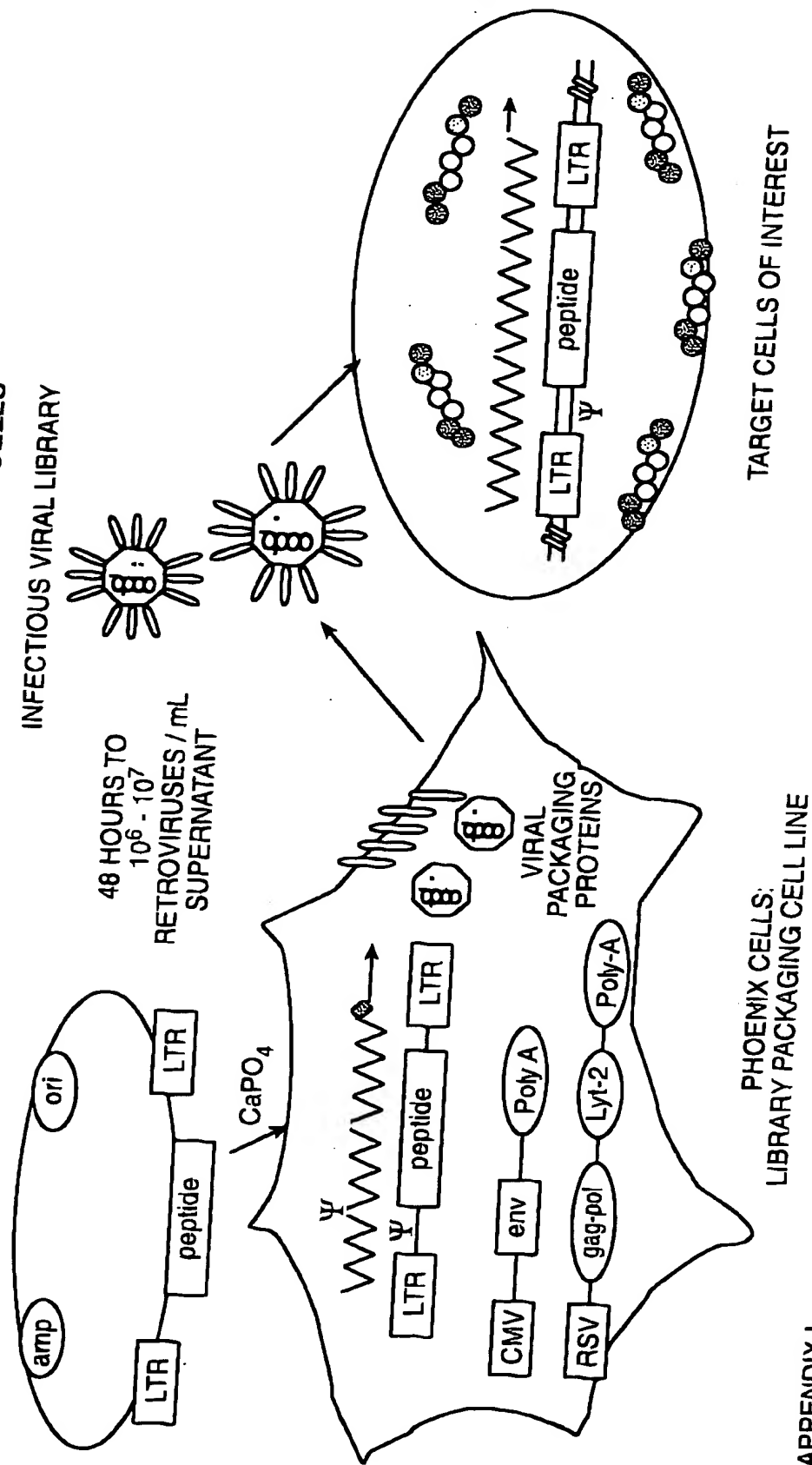
CRU5, MODIFIED LTR
LTR, LONG TERMINAL REPEAT
 $\Psi+$, PACKING SIGNAL
LOCALIZATION SIGNAL: NUCLEAR, CELL MEMBRANE, GRANULAR
MCS, MULTIPLE CLONING SITE
IRES, INTERNAL RIBOSOME ENTRY SITE
2a, SELF-CLEAVING PEPTIDE

APPENDIX I

FIG. 6

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PROTOCOL FOR TRANSFECTION OF PHOENIX CELLS AND INFECTION OF NONADHERENT TARGET CELLS



APPENDIX I

FIG. 7

ε HEAVY CHAIN GFP / BFP KNOCK-IN CELL LINE
U266 ε HEAVY CHAIN

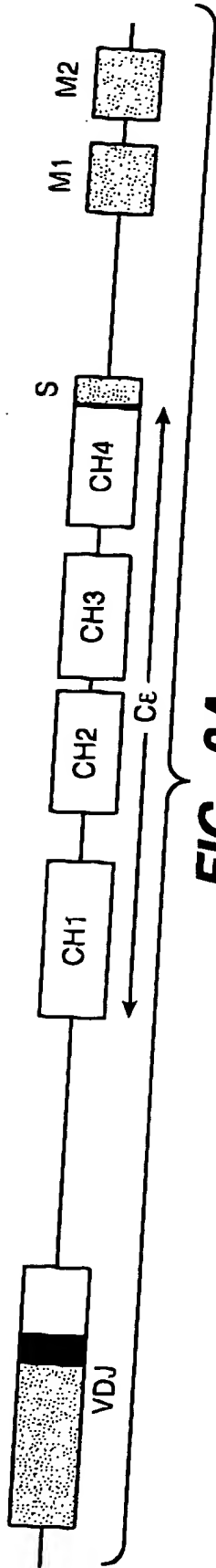
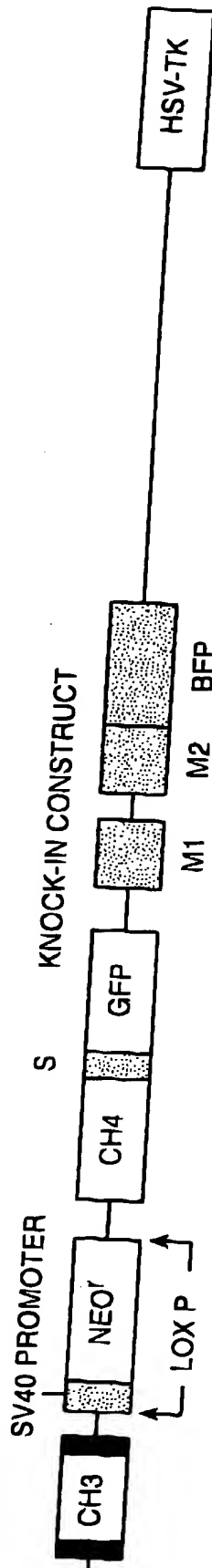


FIG. 8A

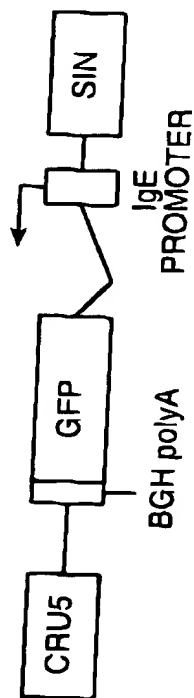


U266 CELLS ARE TRANSFECTED AND SELECTED WITH G418. SURVIVORS ARE TREATED WITH GANCICLOVIR (HSV-TK DELETED DURING HOMOLOGOUS RECOMBINATION). RT-PCR IS PERFORMED TO CONFIRM HOMOLOGOUS RECOMBINATION. THOSE CLONES ARE TRANSFECTED WITH *cre* TO REMOVE THE SV40 NEOMYCIN RESISTANCE GENE.

APPENDIX D

S, SECRETORY EXON
GFP, GREEN FLUORESCENT PROTEIN
BFP, BLUE FLUORESCENT PROTEIN
Neo', NEOMYCIN RESISTANCE GENE
VDJ, V REGION EXON
CH 1, 2, 3, 4, CONSTANT REGION DOMAIN EXONS
M1, M2, MEMBRANE EXONS
HSV-TK, HERPES SIMPLEX VIRUS-THYMIDINE KINASE

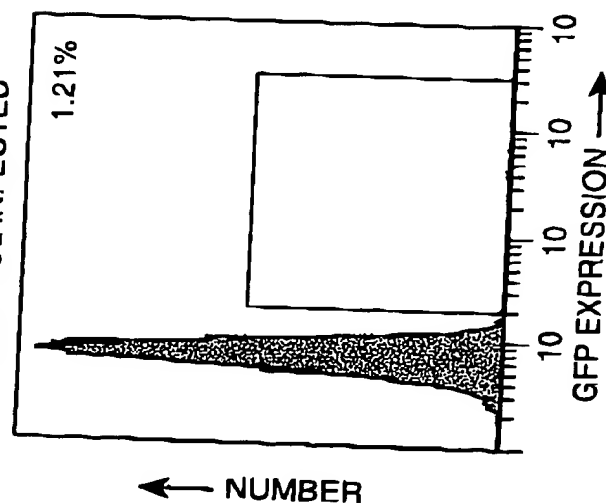
FIG. 8B

IL-4 INDUCIBLE ϵ PROMOTER REPORTER CELL LINEREPORTER CONSTRUCT

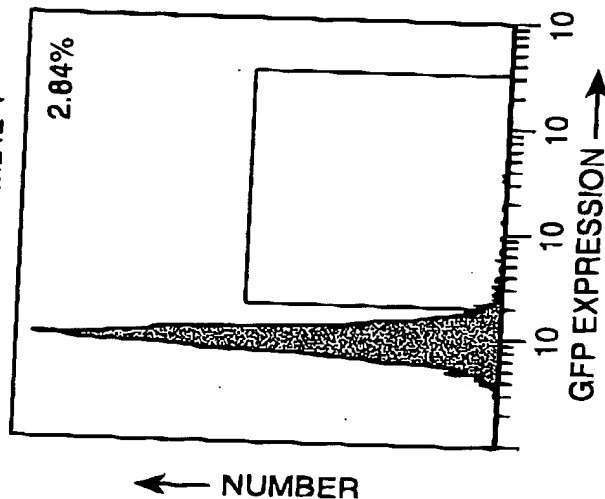
CRU5, hCMV PROMOTER PLUS R AND U5 REGIONS OF LTR
GFP, GREEN FLUORESCENT PROTEIN
BGH poly A, BOVINE GROWTH HORMONE poly-ADENYLATION SIGNAL
SIN, SELF-INACTIVATING LTR

IL-4 INDUCED REPORTER

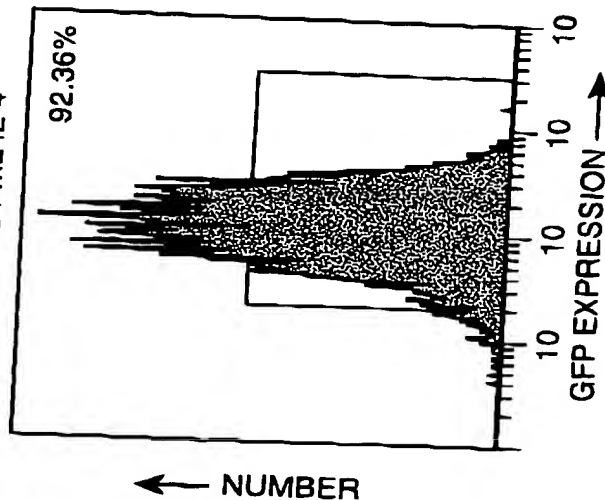
CONTROL INFECTED



0 UNITS / mL IL-4



200 UNITS / mL IL-4

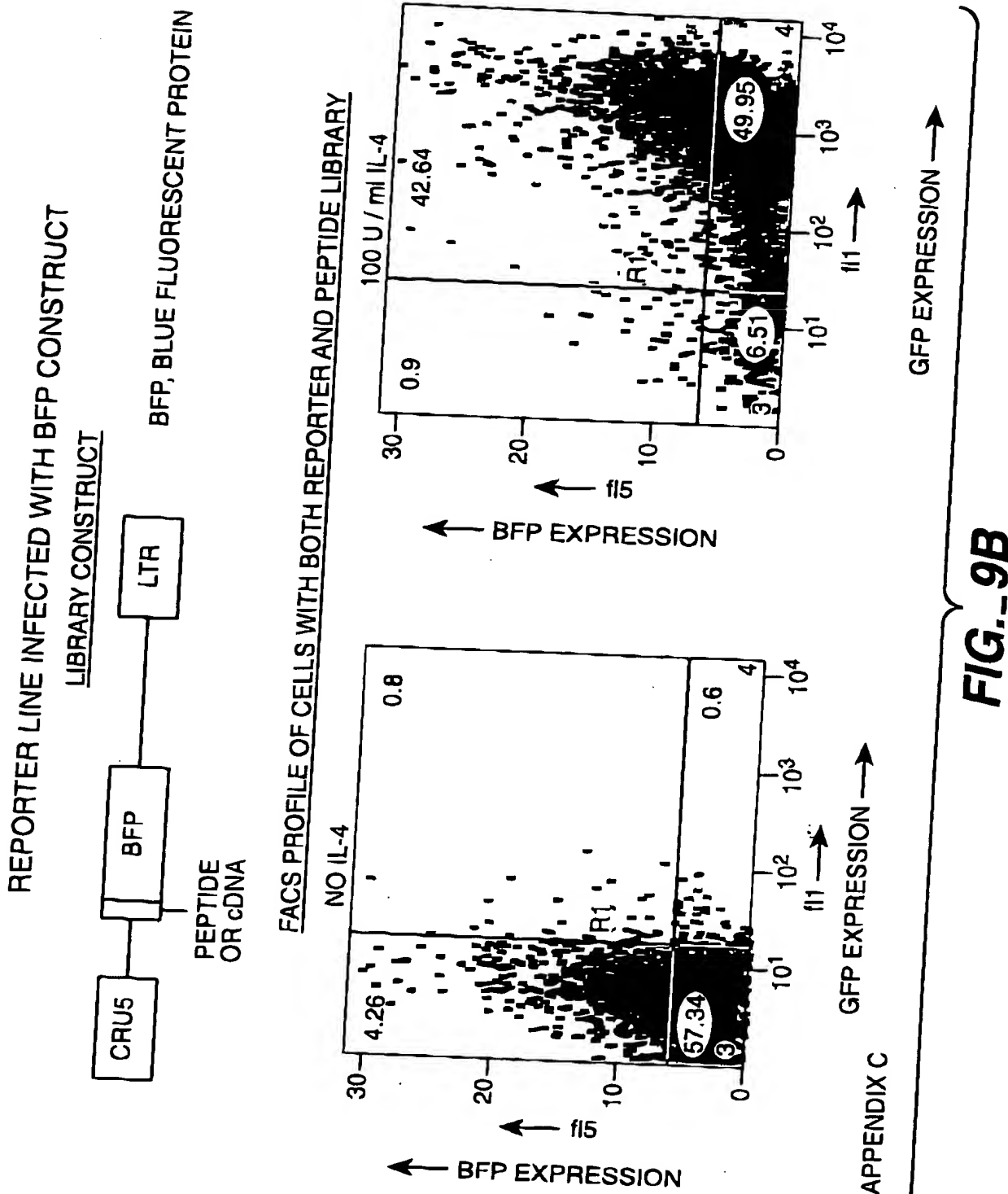


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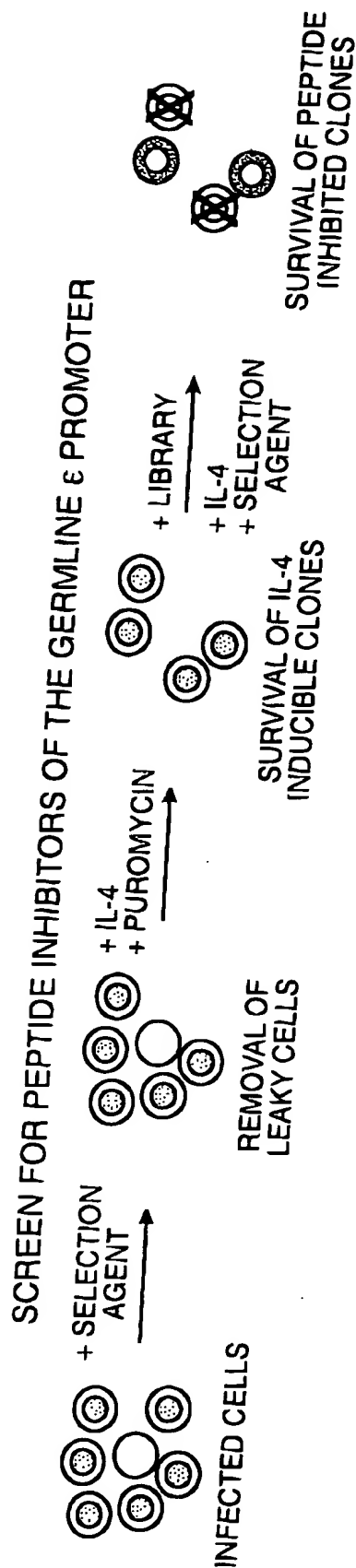
FIG. 9A

APPENDIX C

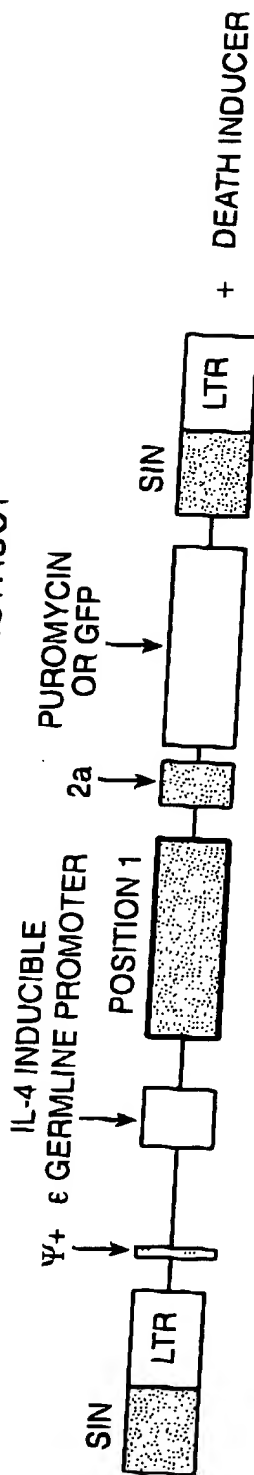
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SURVIVAL CONSTRUCT



POSITION 1

FAS CHIMERIC RECEPTOR*

*(MOUSE FASK EXTERNAL / MOUSE CD8
EXTERNAL + HUMAN TRANSMEMBRANE
AND CYTOPLASMIC DOMAINS)

HSV-TK

P450.2B1

p21 PEPTIDE

SIN, SELF-INACTIVATING LTR,
LTR, LONG TERMINAL REPEAT

SELECTION AGENT

 α FAS

GANCICLOVIR

CYCLOPHOSPHAMIDE

NONE (SELF SELECTION)

ALL COMPONENTS ARE CASSETTED FOR FLEXIBILITY

APPENDIX D

FIG. 10

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1-845 CMV promoter/R/U5 5' LTR
1322 GAG ATG-ATC mutation
850-2100 extended Ψ region
2146-2173 two Bstx1 peptide cloning sites
2205-2723 ECMV IRES (cloned as EcoR1/MscI fragment from
pCITE-4a [Novagen])
2746-3465 GFP coding region
3522-4115 3' LTR
4122-6210 pGEM backbone (pUC origin, ampR)

ATCACGAGGCCCTTTTCGTCTTCAAGAACAGCTTTGCTCTTAGGAGTTTCCTAATACATCC
CAAAC TCAAATATATAAAGCATTGTGACTTGTCTATGCCCTAGTTATTAATAGTAATCAA
TTACGGGGGTCATTAGTTCATAGCCCATATATGGAGTTCCGCGTTACATAACTTACGGTAA
ATGGCCCCGCTGGCTGACCGCCCAACGACCCCCGCCCATTGACGTCAATAATGACGTATG
TTCCCATAGTAACGCCAATAGGGACTTTCCATTGACGTCAATGGGTGGAGTATTTACGGT
AAACTGCCCCACTTGGCAGTACATCAAGTGTATCATATGCCAAGTACGCCCCCTATTGACG
TCAATGACGGTAAATGGCCCCGCTGGCATTATGCCCAGTACATGACCTTATGGGACTTTC
CTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGATGCGGTTTTGGC
AGTACATCAATGGGCGTGGATAGCGGTTTGACTCACGGGGATTTCCAAGTCTCCACCCCA
TTGACGTCAATGGGAGTTTGT TTTGGCACCAAAATCAACGGGACTTTCCAAAATGTCGTA
ACAAC TCCGCCCCATTGACGCAAATGGGCGGTAGGCATGTACGGTGGGAGGTCTATATAA
GCAGAGCTCAATAAAAGAGCCCAACACCCCTCACTCGGGGCGCCAGTCCTCCGATTGACT
GAGTCGCCCCGGGTACCCGTGTATCCAATAAACCCCTCTTGCAAGTTGCATCCGACTTGTGGT
CTCGCTGTTCTTGGGAGGGTCTCCTCTGAGTGATTGACTACCCGTCAGCGGGGGTCTTT
CATTTGGGGGCTCGTCCGGGATCGGGAGACCCCTGCCCAGGGACCACCGACCCACCACCG
GGAGGTAAGCTGGCCAGCAACTTATCTGTGTCTGTCCGATTGTCTAGTGTCTATGACTGA
TTTTATGCGCCTGCGTCCGGTACTAGTTAGCTAACTAGCTCTGTATCTGGCGGACCCGTGG
TGGAAC TGACGAGTTCGGAACACCCGGCCGCAACCCTGGGAGACGTCCCAGGGACTTCGG
GGGCCGTTTTTGTGGCCCCGACCTGAGTCCAAAAATCCCGATCGTTTTGGACTCTTTGGTG
CACCCCCCTTAGAGGAGGGATATGTGGTTCTGGTAGGAGACGAGAACCTAAAACAGTTCC
CGCCTCCGTCTGAATTTTTGCTTTCCGGTTTGGGACCGAAGCCGCGCCGCGCTCTTGTCT
GCTGCAGCATCGTTCTGTGTGTCTGTCTGACTGTGTTTCTGTATTTGTCTGAAAATA
TCGGCCCCGGGCCAGACTGTTACCACTCCCTTAAGTTTGACCTTAGGTCACTGGAAAGATG
TCGAGCGGATCGCTCACAACCAAGTCGGTAGATGTCAAGAAGAGACGTTGGGTACCTTCT
GCTCTGCAGAATGGCCAACCTTTAACGTCGGATGGCCGCGAGACGGCACCTTTAACCGAG
ACCTCATCACCCAGGTTAAGATCAAGGTCTTTTCACTGGCCCCGCATGGACACCCAGACC
AGGTCCCCTACATCGTGACCTGGGAAGCCTTGGCTTTTGACCCCCCTCCCTGGGTCAAGC
CCTTTGTACACCCTAAGCCTCCGCCTCCTCTTCCCTCCATCCGCCCCGTCTCTCCCCCTTG
AACCTCCTCGTTTCGACCCCCGCTCGATCCTCCTTTATCCAGCCCTCACTCCTTCTCTAG
GCGCCCCCATATGGCCATATGAGATCTTATATGGGGCACCCCCGCCCCCTTGTAACCTTCC
CTGACCCTGACATGACAAGAGTTACTAACAGCCCCCTCTCTCCAAGCTCACTTACAGGCTC
TCTACTTAGTCCAGCACGAAGTCTGGAGACCTCTGGCGGCAGCCTACCAAGAACAACCTGG
ACCGACCGGTGGTACCTCACCTTACCGAGTCGGCGACACAGTGTGGGTCCGCCGACACC
AGACTAAGAACCTAGAACCTCGCTGGAAAGGACCTTACACAGTCCTGCTGACCACCCCCA
CCGCCCTCAAAGTAGACGGCATCGCGCTTGGATACACGCCGCCACGTGAAGGCTGCCGA
CCCCGGGGGTGGACCATCCTCTAGACTGCCGGATCTCGAGGGATCCACCACCATGGACCC
CCATTAAATTGGAATTCTCTGCAGCCCCGGGGGATCCACTAGTTCTAGAGCGAATTAATTCC

FIG. 11A-1

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GGTTATTTTCCACCATATTGCCGTCTTTTGGCAATGTGAGGGCCCCGGAACCTGGCCCTG
TCTTCTTGACGAGCATTCCTAGGGGTCTTTCCCTCTCGCCAAAGGAATGCAAGGTCTGT
TGAATGTCGTGAAGGAAGCAGTTCCTCTGGAAGCTTCTTGAAGACAAACAACGTCTGTAG
CGACCCTTTGCAGGCAGCGGAACCCCCACCTGGCGACAGGTGCCCTCTGCGGCCAAAAGC
CACGTGTATAAGATACACCTGCAAAGGCGGCACAACCCAGTGCCACGTTGTGAGTTGGA
TAGTTGTGGAAAGAGTCAAATGGCTCTCCTCAAGCGTATTCAACAAGGGGCTGAAGGATG
CCCAGAAGGTACCCCATTTGTATGGGATCTGATCTGGGGCCTCGGTGCACATGCTTTACAT
GTGTTTAGTCGAGGTTAAAAACGTCTAGGCCCCCCGAACCACGGGGACGTGGTTTTCTCT
TTGAAAAACACGATGATAATATGGGGGATCCACCGGTCCGCCACCATGGTGAGCAAGGGCG
AGGAGCTGTTTACCGGGGTGGTGCCCATCCTGGTTCGAGCTGGACGGCGACGTAAACGGCC
ACAAGTTTACGCGTGTCCGGCGAGGGCGAGGGCGATGCCACCTACGGCAAGCTGACCTGA
AGTTCATCTGCACCACCGGCAAGCTGCCCCGTGCCCTGGCCACCCCTCGTGACCACCTGA
CCTACGGCGTGCAGTGCTTCAGCCGCTACCCCGACCACATGAAGCAGCAGCACTTCTTCA
AGTCCGCCATGCCCGAAGGCTACGTCCAGGAGCGCACCATCTTCTTCAAGGACGACGGCA
ACTACAAGACCCGCGCCGAGGTGAAGTTCGAGGGCGACACCCTGGTGAACCGCATCGAGC
TGAAGGGCATCGACTTCAAGGAGGACGGCAACATCCTGGGGCACAAGCTGGAGTACAAC
ACAACAGCCACAACGTCTATATCATGGCCGACAAGCAGAAGAACGGCATCAAGGTGAAC
TCAAGATCCGCCACAACATCGAGGACGGCAGCGTGCAGCTCGCCGACCACTACCAGCAGA
ACACCCCATCGGGCGACGGCCCCGTGCTGCTGCCCGACAACCACTACCTGAGCACCCAGT
CCGCCCTGAGCAAAGACCCCAACGAGAAGCGCGATCACATGGTCTCTGAGTTTCGTGA
CCGCCGCCGGGATCACTCTCGGCATGGACGAGCTGTACAAGTAAAGCGGCCGCTCGACGA
TAAAATAAAAGATTTTATTAGTCTCCAGAAAAAGGGGGGAATGAAAGACCCACCTGTA
GGTTTGGCAAGCTAGCTTAAGTAACGCCATTTTGCAAGGCATGGAATAACATAACTGA
GAATAGAGAAGTTCAGATCAAGGTGAGGAACAGATGGAACAGCTGAATATGGGCCAAACA
GGATATCTGTGGTAAGCAGTTCCTGCCCGGGCTCAGGGCCAAGAACAGATGGAACAGCTG
AATATGGGCCAAACAGGATATCTGTGGTAAGCAGTTCCTGCCCGGGCTCAGGGCCAAGAA
CAGATGGTCCCCAGATGCGGTCCAGCCCTCAGCAGTTTCTAGAGAACCATCAGATGTTTC
CAGGGTGCCCCAAGGACCTGAAATGACCCTGTGCCCTTATTTGAACTAACCAATCAGTTCG
CTTCTCGCTTCTGTTCGCGCGCTTCTGCTCCCCGAGCTCAATAAAAGAGCCCACAACCCC
TCACTCGGGGCGCCAGTCCCTCCGATTGACTGAGTGCCTCGGGTACCCGTGTATCCAATAA
ACCCTCTTGACAGTTGCATCCGACTTGTGGTCTCGCTGTTTCTTGGGAGGGTCTCCTCTGA
GTGATTGACTACCCGTCAGCGGGGGTCTTTTCAATTTCCGACTTGTGGTCTCGCTGCCTTGG
GAGGGTCTCCTCTGAGTGATTGACTACCCGTCAGCGGGGGTCTTTCACATGCAGCATGTAT
CAAAATTAATTTGGTTTTTTTTCTTAAGTATTTACATTAATGGCCATAGTTGCATTAAT
GAATCGGCCAACGCGCGGGGAGAGGCGGTTTGCATGTTGGCGCTCTTCCGCTTCTCGCT
CACTGACTCGCTGCGCTCGGTTCGGCTGCGGCGAGCGGTATCAGCTCACTCAAAGGC
GGTAATACGGTTATCCACAGAATCAGGGGATAACGCAGGAAAGAACATGTGAGCAAAAGG
CCAGCAAAAGGCCAGGAACCGTAAAAAGGCCGCGTTGCTGGCGTTTTTCCATAGGCTCCG
CCCCCTGACGAGCATCACAAAAATCGACGCTCAAGTCAGAGGTGGCGAAACCCGACAGG
ACTATAAAGATACCAGGCGTTTCCCCCTGGAAGCTCCCTCGTGCGCTCTCCTGTTCCGAC
CCTGCCGCTTACCGGATACCTGTCCGCTTCTTCCCTTCGGGAAGCGTGGCGCTTCTCTCA
TAGCTCACGCTGTAGGTATCTCAGTTCGGTGTAGGTGCTTCGCTCCAAGCTGGGCTGTGT
GCACGAACCCCCCGTTTACGCCCCGACCGCTGCGCCTTATCCGGTAACATCGTCTTGAGTC
CAACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAG
AGCGAGGTATGTAGGCGGTGCTACAGAGTTCTTGAAGTGGTGGCCTAACTACGGCTACAC

FIG. 11A-2

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TAGAAGGACAGTATTTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTTCGGAAAAAGAGT
TGGTAGCTCTTGATCCGGCAAACAAACCACCGCTGGTAGCGGTGGTTTTTTTGTGTTGCAA
GCAGCAGATTACGCGCAGAAAAAAGGATCTCAAGAAGATCCTTTGATCTTTTCTACGGG
GTCTGACGCTCAGTGGAACGAAAACTCACGTTAAGGGATTTTGGTCATGAGATTATCAAA
AAGGATCTTCACCTAGATCCTTTTAAATTAAAAATGAAGTTTGCAGCAAATCAATCTAAAG
TATATATGAGTAAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCTC
AGCGATCTGTCTATTTTCGTTTCATCCATAGTTGCCTGACTCCCCGTCGTGTAGATAACTAC
GATACGGGAGGGCTTACCATCTGGCCCCAGTGCTGCAATGATACCGCGAGACCCACGCTC
ACCGGCTCCAGATTTATCAGCAATAAACCAGCCAGCCGGAAGGGCCGAGCGCAGAAGTGG
TCCTGCAACTTTATCCGCCTCCATCCAGTCTATTAATTGTTGCCGGGAAGCTAGAGTAAG
TAGTTCGCCAGTTAATAGTTTGGCGAACGTTGTTGCCATTGCTACAGGCATCGTGGTGTC
ACGCTCGTCGTTTGGTATGGCTTCATTTCAGCTCCGGTTCCCAACGATCAAGGCGAGTTAC
ATGATCCCCCATGTTGTGCAAAAAAGCGGTTAGCTCCTTCGGTCCTCCGATCGTTGTCAG
AAGTAAGTTGGCCGCAGTGTTATCACTCATGGTTATGGCAGCACTGCATAATTCTCTTAC
TGTCATGCCATCCGTAAGATGCTTTTCTGTGACTGGTGAGTACTCAACCAAGTCATTCTG
AGAATAGTGTATGCGGCGACCGAGTTGCTCTTGCCCGGCGTCAACACGGGATAATACCGC
GCCACATAGCAGAACTTTAAAAGTGCTCATCATTGGAAAACGTTCTTCGGGGCGAAAACT
CTCAAGGATCTTACCGCTGTTGAGATCCAGTTCGATGTAACCCACTCGTGCACCCAACTG
ATCTTCAGCATCTTTTACTTTCACCAGCGTTTCTGGGTGAGCAAAAACAGGAAGGCAAAA
TGCCGCAAAAAAGGGAATAAGGGCGACACGGAAATGTTGAATACTCATACTCTTCCTTTT
TCAATATTATTGAAGCATTTATCAGGGTTATTGTCTCATGAGCGGATACATATTGGAATG
TATTTAGAAAAATAAACAAATAGGGGTTCCGCGCACATTTT

FIG. 11A-3

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1-845 CMVpromoter/R/U5 5' LTR
1322 GAG ATG-ATC mutation
850-2100 extended ψ region
2151-2865 GFP coding region
2866-2894 GGGSGGG linker
2895-2952 FMDV 2a cleavage sequence
2953-3004 Bstx1/Bstx1/HinD3/Hpa1/Sal1/Not1 polylinker
3052-3645 3' LTR
3652-5715 pGEM backbone (pUC origin, ampR)

ATCACGAGGCCCTTTCGTCTTCAAGAACAGCTTTGCTCTTAGGAGTTTCCTAATACATC
CCAAACTCAAATATATAAAGCATTGACTTGTTCTATGCCCTAGTTATTAATAGTAATC
AATTACGGGGTCATTAGTTCATAGCCCATATATGGAGTTCGCGGTTACATAACTTACGG
TAAATGGCCCGCCTGGCTGACCGCCCAACGACCCCGCCCATTGACGTCAATAATGACG
TATGTTCCCATAGTAACGCCAATAGGGACTTTCATTGACGTCAATGGGTGGAGTATTT
ACGGTAAACTGCCCACTTGGCAGTACATCAAGTGTATCATATGCCAAGTACGCCCCCTA
TTGACGTCAATGACGGTAAATGGCCCGCCTGGCATTATGCCCAGTACATGACCTTATGG
GACTTTTCTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGATGCG
GTTTTGGCAGTACATCAATGGGCGTGGATAGCGGTTTGGACTCACGGGGATTTCCAAGTC
TCCACCCCATTGACGTCAATGGGAGTTTGTTTTGGCACCAAATCAACGGGACTTTCCA
AAATGTCTGTAACAACTCCGCCCCATTGACGCAAAATGGGCGGTAGGCATGTACGGTGGGA
GGTCTATATAAGCAGAGCTCAATAAAGAGCCCAACCCCTCACTCGGGGCGCCAGTC
CTCCGATTGACTGAGTCGCCCCGGGTACCCGTGTATCCAATAAACCCCTCTTGCAAGTTGCA
TCCGACTTGTGGTCTCGCTGTTTCTTGGGAGGGTCTCCTCTGAGTGATTGACTACCCGT
CAGCGGGGGTCTTTCATTTGGGGGCTCGTCCGGGATCGGGAGACCCCTGCCAGGGGACC
ACCGACCCACCACCGGGAGGTAAGCTGGCCAGCAACTTATCTGTGTCTGTCCGATTGTC
TAGTGTCTATGACTGATTTTATGCGCCTGCGTCCGGTACTAGTTAGCTAACTAGCTCTGT
ATCTGGCGGACCCGTGGTGGAAGTACGAGTTTCGGAACACCCGGCCGCAACCCTGGGAG
ACGTCCCAGGGACTTTCGGGGGCGGTTTTTGTGGCCCGACCTGAGTCCAAAAATCCCGAT
CGTTTTGGACTCTTTGGTGACCCCCCTTAGAGGAGGGATATGTGGTTCTGGTAGGAGA
CGAGAACCTAAACAGTTCCCGCCTCCGTCTGAATTTTTGCTTTCGGTTTGGGACCGAA
GCCGCGCCGCGCTCTTGTCTGCTGCAGCATCGTTCTGTGTTGTCTCTGTCTGACTGTG
TTTCTGTATTTGTCTGAAAAATATCGGCCCGGGCCAGACTGTTACCACTCCCTTAAGTTT
GACCTTAGGTCACTGGAAAGATGTCGAGCGGATCGCTCACAACCAAGTCGGTAGATGTCA
AGAAGAGACGTTGGGTTACCTTCTGCTCTGCAGAATGGCCAACCTTTAACGTCGGATGG
CCGCGAGACGGCACCTTTAACCGAGACCTCATCACCCAGGTTAAGATCAAGGTCTTTTC
ACCTGGCCCCGCATGGACACCCAGACCAGGTCCCTTACATCGTGACCTGGGAAGCCTTGG
CTTTTGACCCCCCTCCCTGGGTCAAGCCCTTTGTACACCCCTAAGCCTCCGCCTCCTCTT
CCTCCATCCGCCCCGTCTCTCCCCCTTGAACCTCCTCGTTTCGACCCCGCCTCGATCCTC
CCTTTATCCAGCCCTCACTCCTTCTCTAGGCGCCCCCATATGGCCATATGAGATCTTAT
ATGGGGCACCCCGCCCCCTTGTAAGTTCCTTGACCCTGACATGACAAGAGTTACTAAC
AGCCCCCTCTCTCCAAGCTCACTTACAGGCTCTCTACTTAGTCCAGCACGAAGTCTGGAG
ACCTCTGGCGGCAGCCTACCAAGAACAAGTGGACCGACCGGTGGTACCTCACCTTACC
GAGTCGGCGACACAGTGTGGGTCCGCGGACACCCAGACTAAGAACCTAGAACCTCGCTGG
AAAGGACCTTACACAGTCTGTGCTGACCACCCCAACCGCCCTCAAAGTAGACGGCATCGC
AGCTTGGATACACGCGCCACGTAAGGCTGCCGACCCCGGGGGTGGACCATCCTCTA
GACTGCCGGATCTCGAGGGATCCACCATGGTGAGCAAGGGCGAGGAGCTGTTACCGGG

FIG. 11B-1

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GTGGTGCCCATCCTGGTCGAGCTGGACGGCGACGTAAACGGGCCACAAGTTCAGCGTGTC
CGGCGAGGGCGAGGGCGATGCCACCTACGGCAAGCTGACCCTGAAGTTCATCTGCACCA
CCGGCAAGCTGCCCCGTGCCCT GCCCACCCTCGTGACCACCCTGACCTACGGCGTGACG
TGCTTCAGCCGCTACCCCGACCACATGAAGCAGCAGGACTTCTTCAAGTCCGCCATGCC
CGAAGGCTACGTCCAGGAGCGCACCATCTTCTTCAAGGACGACGGCAACTACAAGACCC
GCGCCGAGGTGAAGTTCGAGGGCGACACCCTGGTGAACCGCATCGAGCTGAAGGGCATC
GACTTCAAGGAGGACGGCAACATCCTGGGGCACAAGCTGGAGTACAACCTACAACAGCCA
CAACGTCTATATCATGGCCGACAAGCAGAAGAAGCGGCATCAAGGTGAAGTTCAGATCC
GCCACAACATCGAGGACGGCAGCGTGACGCTCGCCGACCACTACCAGCAGAACACCCCC
ATCGGCGACGGCCCCGTGCTGCTGCCCCGACAACCACTACCTGAGCACCCAGTCCGCCCT
GAGCAAAGACCCCAACGAGAAGCGCGATCACATGGTCTGCTGGAGTTCGTGACCGCCG
CCGGGATCACTCTCGGCATGGACGAGCTGTACAAGGAATTCGGAGGTGGCAGCGGTGGC
GGTCAGCTGTTGAATTTTGACCTTCTTAACTTGCGGGAGACGTCGAGTCCAACCTGG
GCCCCACCACCACCATGGAAGCTTCCATTAAATTGGTTAACGTCGACGCGGCCGCTCGAC
GATAAAATAAAAGATTTTATTAGTCTCCAGAAAAAGGGGGGAATGAAAGACCCACCT
GTAGGTTTGGCAAGCTAGCTTAAGTAACGCCATTTTGCAAGGCATGGAAAAATACATAA
CTGAGAATAGAGAAGTTCAGATCAAGGTCAGGAACAGATGGAACAGCTGAATATGGGCC
AAACAGGATATCTGTGGTAAGCAGTTCTTCCCCGGCTCAGGGCCAAGAACAGATGGAA
CAGCTGAATATGGGCCAAACAGGATATCTGTGGTAAGCAGTTCTTCCCCGGCTCAGGG
CCAAGAACAGATGGTCCCCAGATGCGGTCCAGCCCTCAGCAGTTTCTAGAGAACCATCA
GATGTTTCCAGGGTGCCCCAAGGACCTGAAATGACCCTGTGCCTTATTTGAACTAACCA
ATCAGTTTCGCTTCTCGCTTCTGTTCGCGCGCTTCTGCTCCCCGAGCTCAATAAAAGAGC
CCACAACCCTCACTCGGGGCGCCAGTCTCCGATTGACTGAGTCGCCCCGGGTACCCGT
GTATCCAATAAACCTCTTGCAGTTGCATCCGACTTGTGGTCTCGCTGTTCTTGGGAG
GGTCTCCTCTGAGTGATTGACTACCCGTCAGCGGGGGTCTTTCATTTCCGACTTGTGGT
CTCGCTGCCTTGGGAGGGTCTCCTCTGAGTGATTGACTACCCGTCAGCGGGGGTCTTCA
CATGCAGCATGTATCAAAATTAATTTGGTTTTTTTTTCTTAAGTATTTACATTAAATGGC
CATAGTTGCATTAATGAATCGGCCAACGCGCGGGGAGAGGCGGTTTGGCTATTGGCGCT
CTTCCGCTTCTCTCGCTCACTGACTCGCTCGCTCGGTCGTTCCGCTGCGGCGAGCGGTA
TCAGCTCACTCAAAGGCGGTAATACGGTTATCCACAGAATCAGGGGATAACGCAGGAAA
GAACATGTGAGCAAAAGGCCAGCAAAAGGCCAGGAACCGTAAAAAGGCCGCGTTGCTGG
CGTTTTTCCATAGGCTCCGCCCCCTGACGAGCATCACAAAAATCGACGCTCAAGTCAG
AGGTGGCGAAACCCGACAGGACTATAAAGATACCAGGCGTTTCCCCCTGGAAGCTCCCT
CGTGCGCTCTCCTGTTCCGACCCTGCCGCTTACCGGATACCTGTCCGCCTTTCTCCCTT
CGGGAAGCGTGCGCTTTCTCATAGCTCACGCTGTAGGTATCTCAGTTCGGTGTAGGTC
GTTGCTCCAAGCTGGGCTGTGTGCACGAACCCCCGTTTCAGCCCCGACCGCTGCGCCTT
ATCCGGTAACATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATCGCCACTGGCAG
CAGCCACTGGTAACAGGATTAGCAGAGCGAGGTATGTAGGCGGTGCTACAGAGTCTTG
AAGTGGTGCCCTAACTACGGCTACACTAGAAGGACAGTATTTGGTATCTGCGCTCTGCT
GAAGCCAGTTACCTTCGGA AAAAGAGTTGGTAGCTCTTGATCCGGCAAAACAAACCACCG
CTGGTAGCGGTGGTTTTTTTTTGTGTTGCAAGCAGCAGATTACGCGCAGAAAAAAGGATCT
CAAGAAGATCCTTTGATCTTTTCTACGGGGTCTGACGCTCAGTGGAAACGAAACTCACG
TTAAGGGATTTTGGTCATGAGATTATCAAAAAGGATCTTCACCTAGATCCTTTTAAATT
AAAAATGAAGTTTGGCGAAATCAATCTAAAGTATATATGAGTAACTTGGTCTGACAGT
TACCAATGCTTAATCAGTGAGGCACCTATCTCAGCGATCTGTCTATTTTCGTTTCATCCAT
AGTTGCCTGACTCCCCGTCGTGTAGATAACTACGATACGGGAGGGCTTACCATCTGGCC
CCAGTGCTGCAATGATACCGCGAGACCCACGCTCACCGGCTCCAGATTTATCAGCAATA

FIG. 11B-2

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AACCAGCCAGCCGGAAGGGCCGAGCGCAGAAGTGGTCCTGCAACTTTATCCGCCTCCAT
CCAGTCTATTAATTGTTGCCGGGAAGCTAGAGTAAGTAGTTCGCCAGTTAATAGTTTGC
GCAACGTTGTTGCCATTGCTACAGGCATCGTGGTGTACGCTCGTCGTTTGGTATGGCT
TCATTCAGCTCCGGTTCCCAACGATCAAGGCGAGTTACATGATCCCCCATGTTGTGCAA
AAAAGCGGTTAGCTCCTTCGGTCCCTCCGATCGTTGTCAGAAGTAAGTTGGCCGCGAGTGT
TATCACTCATGGTTATGGCAGCACTGCATAATTCTCTTACTGTCATGCCATCCGTAAGA
TGCTTTTCTGTGACTGGTGAGTACTCAACCAAGTCATTCTGAGAATAGTGTATGCGGCG
ACCGAGTTGCTCTTGCCCGGCGTCAACACGGGATAATACCGCGCCACATAGCAGAACTT
TAAAAGTGCTCATCATTGGAAAACGTTCTTCGGGGCGAAAACCTCTCAAGGATCTTACCG
CTGTTGAGATCCAGTTCGATGTAACCCACTCGTGCACCCAACTGATCTTCAGCATCTTT
TACTTTCACCAGCGTTTCTGGGTGAGCAAAAACAGGAAGGCAAAATGCCGCAAAAAGG
GAATAAGGGCGACACGGAAATGTTGAATACTCATACTCTTCCTTTTTCAATATTATTGA
AGCATTTATCAGGGTTATTGTCTCATGACATTAACCTATAAAAATAGGCGT

FIG._11B-3

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1-845 CMV promoter/R/U5 5' LTR
1322 GAG ATG-ATC mutation
850-2100 extended ψ region
2146-2173 two Bstx1 peptide cloning sites
2173-2214 EcoRI/ApaI/HpaI/NotI polylinker
2262-2855 3' LTR
2855-4901 pGEM backbone (pUC origin, ampR)

ATCACGAGGCCCTTTCGTCTTCAAGAACAGCTTTGCTCTTAGGAGTTTCCTAATACATC
CCAAACTCAAATATATAAAGCATTGTGACTTGTTCTATGCCCTAGTTATTAATAGTAATC
AATTACGGGGTCATTAGTTCATAGCCATATATGGAGTTCCGCGTTACATAACTTACGGT
AAATGGCCCGCCTGGCTGACCGCCCAACGACCCCGCCCATTGACGTCAATAATGACGT
ATGTTCCCATAGTAACGCCAATAGGGACTTTCATTGACGTCAATGGGTGGAGTATTTA
CGGTAAACTGCCCACCTGGCAGTACATCAAGTGTATCATATGCCAAGTACGCCCCCTAT
TGACGTCAATGACGGTAAATGGCCCGCCTGGCATTATGCCCAGTACATGACCTTATGGG
ACTTTCCTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGTATGCGG
TTTTGGCAGTACATCAATGGGCGTGGATAGCGGTTTGAATCACGGGGATTTCGAAGTCT
CCACCCCATTGACGTCAATGGGAGTTTGTGTTTGGCACCAAAATCAACGGGACTTTCCAA
AATGTCGTAACTCCGCCCCATTGACGCAAAATGGGCGGTAGGCATGTACGGTGGGAG
GTCTATATAAGCAGAGCTCAATAAAGAGCCCAACCCCTCACTCGGGGCGCCAGTCC
TCCGATTGACTGAGTCGCCCCGGGTACCCGTGTATCCAATAAACCCCTCTTGACAGTTGCAT
CCGACTTGTGGTCTCGCTGTTCTTGGGAGGGTCTCCTCTGAGTGATTGACTACCCGTC
AGCGGGGGTCTTTCATTGTTGGGGGCTCGTCCGGGATCGGGAGACCCCTGCCAGGGACCA
CCGACCCACCACCGGGAGGTAAGCTGGCCAGCAACTTATCTGTGTCTGTCCGATTGTCT
AGTGTCTATGACTGATTTTATGCGCCTGCGTCGGTACTAGTTAGCTAAGTCTGTCTGTA
TCTGGCGGACCCGTGGTGGAACTGACGAGTTTCGGAACACCCGGCCGCAACCCTGGGAGA
CGTCCCAGGGACTTCGGGGGCGGTTTGTGGCCCCGACCTGAGTCCAAAAATCCCGATC
GTTTTGGACTCTTTGGTGCACCCCCCTTAGAGGAGGGATATGTGGTTCTGGTAGGAGAC
GAGAACCTAAAACAGTTCCCGCCTCCGTCTGAATTTTGGCTTTCGGTTTGGGACCGAAG
CCGCGCCGCGCGTCTTGTCTGCTGACGATCGTTCTGTGTTGTCTCTGTCTGACTGTGT
TTCTGTATTTGTCTGAAAATATCGGCCCCGGGCCAGACTGTTACCACTCCCTTAAGTTTG
ACCTTAGGTCAGTGAAAGATGTCGAGCGGATCGCTCACAACCAGTCGGTAGATGTCAA
GAAGAGACGTTGGGTTACCTTCTGCTCTGCAGAAATGGCCAACCTTTAACGTGGATGGC
CGCGAGACGGCACCTTTAACCGAGACCTCATCACCCAGGTAAAGATCAAGGTCTTTTCA
CCTGGCCCCGCATGGACACCCAGACAGGTCCCCACATCGTGACCTGGGAAGCCTTGGC
TTTTGACCCCCCTCCCTGGGTCAAGCCCTTTGTACACCCTAAGCCTCCGCTCCTCTTC
CTCCATCCGCCCCGTCTCTCCCCCTTGAACCTCCTCGTTTCGACCCCGCCTCGATCCTCC
CTTTATCCAGCCCTCACTCCTTCTCTAGGCGCCCCCATATGGCCATATGAGATCTTATA
TGGGGCACCCCCGCCCCCTTGTAACCTTCCCTGACCCCTGACATGACAAGAGTTACTAACA
GCCCCCTCTCTCAAGCTCACTTACAGGCTCTCTACTTAGTCCAGCACGAAGTCTGGAGA
CCTCTGGCGGCAGCCTACCAAGAACAACCTGGACCGACCGGTGGTACCTCACCCTTACCG
AGTCGGCGACACAGTGTGGGTCCGCGGACACCAGACTAAGAACCTAGAACCTCGCTGGA
AAGGACCTTACACAGTCCTGCTGACCACCCCAACCGCCCTCAAAGTAGACGGCATCGCA
GCTTGGATACACGCCGCCACGTGAAGGCTGCCGACCCCGGGGGTGGACCATCCTCTAG
ACTGCCGGATCTCGAGGGATCCACCACCATGGACCCCATTAATTTGGAATTCGGGGCC
CAAGCTTTGTAAACGTGACGCGGCGCGGTGACGATAAAAATAAAGATTTTATTTAG
TCTCCAGAAAAAGGGGGGAATGAAAGACCCACCTGTAGGTTTGGCAAGCTAGCTTAAG
TAACGCCATTTTGAAGGCATGGAAAAATACATAACTGAGAATAGAGAAGTTCAGATCA

FIG. 11C-1

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AGGTCAGGAACAGATGGAACAGCTGAATATGGGCCAAACAGGATATCTGTGGTAAGCAG
TTCCTGCCCCGGCTCAGGGCCAAGAACAGATGGAACAGCTGAATATGGGCCAAACAGGA
TATCTGTGGTAAGCAGTTCTTCCCCGGCTCAGGGCCAAGAACAGATGGTCCCCAGATG
CGGTCCAGCCCTCAGCAGTTTCTAGAGAACCATCAGATGTTTCCAGGGTGCCCCAAGGA
CCTGAAATGACCCTGTGCCTTATTTGAACTAACCAATCAGTTTCGCTTCTCGCTTCTGTT
CGCGCGCTTCTGCTCCCCGAGCTCAATAAAAGAGCCCACAACCCCTCACTCGGGGCGCC
AGTCCTCCGATTGACTGAGTCGCCCCGGGTACCCGTGTATCCAATAAACCCCTCTTGCACT
TGCATCCGACTTGTGGTCTCGCTGTTCTTGGGAGGGTCTCCTCTGAGTGATTGACTAC
CCGTCAGCGGGGGTCTTTTCATTTCCGACTTGTGGTCTCGCTGCCTTGGGAGGGTCTCCT
CTGAGTGATTGACTACCCGTCAGCGGGGGTCTTTCACATGCAGCATGTATCAAAATTAAT
TTGGTTTTTTTTTCTTAAGTATTTACATTAAATGGCCATAGTTGCATTAATGAATCGGCC
AACGCGCGGGGAGAGGGCGGTTTTCGCTATTGGCGCTCTTCCGCTTCTCCTCGCTCACTGACT
CGCTGCGCTCGGTGCTTTCGGCTGCGGCGAGCGGTATCAGCTCACTCAAAAGGCGGTAATA
CGGTTATCCACAGAATCAGGGGATAACGCGAGGAAAGAACATGTGAGCAAAAGGCCAGCA
AAAGGCCAGGAACCGTAAAAAGGCCGCGTGTGGCGTTTTTCCATAGGCTCCGCCCCC
CTGACGAGCATCACAAAAATCGACGCTCAAGTCAGAGGTGGCGAAACCCGACAGGACTA
TAAAGATACCAGGCGTTTCCCCCTGGAAGCTCCTCCTGCTGCGCTCTCCTGTTCCGACCCT
GCCGCTTACCAGGATACCTGTCCGCTTTCTCCTTCGGGAAGCGTGGCGCTTTCTCATA
GCTCACGCTGTAGGTATCTCAGTTCGGTGTAGGTGCTTCGCTCCAAGCTGGGCTGTGTG
CACGAACCCCCCGTTTCCGCCCCGACCGCTGCGCCTTATCCGGTAAGTATCGTCTTGAGTC
CAACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCA
GAGCGAGGTATGTAGGCGGTGCTACAGAGTTCTTGAAGTGGTGGCCTAACTACGGCTAC
ACTAGAAGGACAGTATTTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTTCGGAAAAAG
AGTTGGTAGCTCTTGATCCGGCAAACAAACCACCGCTGGTAGCGGTGGTTTTTTTTGTTT
GCAAGCAGCAGATTACGCGCAGAAAAAAGGATCTCAAGAAGATCCTTTGATCTTTTCT
ACGGGGTCTGACGCTCAGTGGAACGAAACTCACGTTAAGGGATTTTGGTTCATGAGATT
ATCAAAAAGGATCTTACCTAGATCCTTTTAAATTAATAATGAAGTTTGGCGCAAATCAA
TCTAAAGTATATATGAGTAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCA
CCTATCTCAGCGATCTGTCTATTTTCGTTTATCCATAGTTGCCTGACTCCCCGTCGTGTA
GATAACTACGATACGGGAGGGCTTACCATCTGGCCCCAGTGCTGCAATGATACCGCGAG
ACCCACGCTCACCAGGCTCCAGATTTATCAGCAATAAACAGCCAGCCGGAAGGGCCGAG
CGCAGAAGTGGTCTGCAACTTTATCCGCTCCATCCAGTCTATTAATTGTTGCCGGGA
AGCTAGAGTAAGTAGTTTCGCCAGTTAATAGTTTGGCGCAACGTTGTTGCTTACAG
GCATCGTGGTGTACGCTCGTCGTTTGGTATGGCTTCATTCAGCTCCGGTTCCCAACGA
TCAAGGCGAGTTACATGATCCCCATGTTGTGCAAAAAAGCGGTTAGCTCCTTCGGTCC
TCCGATCGTTGTGCAAGTAAGTTGGCCGCGAGTGTATCACTCATGGTTATGGCAGCAC
TGCATAATTCTCTTACTGTCTATGCCATCCGTAAGATGCTTTTCTGTGACTGGTGAGTAC
TCAACCAAGTCATTCTGAGAATAGTGTATGCGGCGACCGAGTTGCTCTTGCCCGGCGTC
AACACGGGATAATACCGCGCCACATAGCAGAACTTTAAAGTGCTCATCATTGGAAAAC
GTTCTTCGGGGCGAAAACCTCTCAAGGATCTTACCAGTGTGAGATCCAGTTTCGATGTAA
CCCCTCGTGCACCCAACTGATCTTCAGCATCTTTTACTTTTACCAGCGTTTCTGGGTG
AGCAAAAACAGGAAGGCAAAATGCCGCAAAAAAGGGGAATAAGGGCGACACGGAAATGTT
GAATACTCATACTCTTCTTTTCAATATTATTGAAGCATTTATCAGGGTTATTGTCTC
ATGACATTAACCTATAAAAAATAGGCGT

FIG. 11C-2

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(1) C12ScFas Survival construct

C12ScFas: epsilon-cFas(CD95)-Ires-Hygro-BGH polyA put into C12s vector backwards so that no leaky transcription happens through the cmv promoter.

atcacgaggcccttctgcttcaagaacagccttctgctcttaggaggttctcctaataacatccccaaactcaaatatataaagc
atttgacttgttctatgccctagttatttaataagtaatacaattacgggtcatttagttcatagcccatataggagttccg
cgttacataaacttacggttaaatggccgcctggtgacgcccacagaccccccgccttgaagtcgaatgacgtcaaatgacgtatg
ttcccatagtaaacgccaatagggaactttccattgacgtcaatgggtggagatttacggtaaaactgcccaattggcagta
catcaagtgtatcatatgcccaagtacgccccctattgacgtcaatgacgtcaatgggtggagatttacggtaaaactgcccaattggcagta
catgaccttatgggaactttccctacttggcagtaacatcactgacgtcaatgacgtcaatgggtggagatttacggtaaaactgcccaattggcagta
agtacatcaaatgggctggatagcgggttggactcacggggaatttccaaagtctccacccattgacgtcaatgggtggagatttggc
ttttggcaccacaaatacaacgggaactttccaaagtctccacccattgacgtcaatgggtggagatttggc
acggtgggaggtctatatagaacgagactcaataaaagagcccaacccctcactcgggagcgaatggcggttaggcattgt
gagtcgcccgggtaccggtgtatccaataaaacccctcactcgggagcgaatggcggttaggcattgt
tctcctctgagtgatgactaccggtcagcgggggtcttctcatttgggggctcgtccgggagtcggttctcgttctcgttgggaggg
ggacacccgacccacccacgggaggttaagctggcagcgaacttatttgggggctcgtccgggagtcggttctcgttctcgttgggaggg
tcttatggcctcgtcgtggtactagtgactaaactagctctgtatctcgtgggacccctggttggaaactgacgagttcggaa
cacccggcgcgaacctgggagacgtccacgggacttccggggccttcttctggtggcgcacactgagtcacaaatccgga
tcggtttggactcttgggtgcacccctttagaggagggatattgtgtcttgggtcctggttaggagacgagaaactccgga
cgctccgctcgtgaattttgtcttctggtttgggacggaagcgcgcgcgtcttctgctcgtcgcagcactcgttctggt
tcttaggtcactggaaagatgtcgagcggatcgtcacaacacagtcggtagatgtcaagaagagacgttgggttacccttctgac
gctctgcagaatggccaaaccttaacgtcggatggccgcgagacggcacctttaaaccgagacactcaacccaggttaag
atcaagggtctttcacctggccgcgcatggacacccagacaggtcccttacaatcgtgacctgggaagccttgggttacccttct
ccccctccctgggtcaagccctttgtacacccctaaagcctccgctccttctcctccatccgcccgttctcctccctctg
aacctcctcgttcgaccccgctcgtatcctccttataccagccctcactccttctctagggcgcacccatagggccat
gagatcttataatggggcaccccccgccttgtaaaacttccctgacctgacatgacaagagttactaaacagccccctctct
ccaagctcacttacagggtctctacttagtcacgacgaagtctggagacctctggcgagcctaccacagaaacactctct
accgacccggtggtaacctcaccttaccgagtcggcgacacagtggtgggtccgcgacacccagactaaagaacctagaacctg
cgctggaaaggacaccttacacagtcctgctgacacccccacccctcaaaagttagcgggcatcgagcttggatcacacgc
cgccccacgtgaaggctgcgaccccggggtggaccatcctcttagactgcccggatctcgagggatctccccCAGCATGCC

TGCTATTGTCTTCCCAATCTCCCCCTTGCTGTCTTGCCCCACCCACCCCTCCAGAAATAGATGACACCTACTCAGACAA

TGGGATGCAATTCTCTCATTTATTAGGAAAGGACAGTGGGAGTGCCACCTTCCAGGGTCAAGGAAGGCACGGGGGAGGG

GCAACAACAGATGGCTGGCAACTAGAGGCCACAGTCGAGGtCTAGCTTGCCAAACCTACAGSTGGGGTCTTTTCATTCC

FIG.-12A

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FIG.-12C

CCAGAGGCAGGACAGCCAGATCCACACCATGTTGGCTTTACCAACAGTACCGGAATGCCAAGCTTGCGGCCGCTTAAGA
GCTGTAATTGAACCTGGGAGTGGACACCTGTGGAGAGAAAGGCAAAAGTGGATGTCAATAAGACCAATAGGTGCCCTATCAG
AAACGCAAGAGTCTTCTGTCTCGACAAGCCAGTTTCTATTGGTCTCTCTTAAACCTGTCTTGTAACCTTGATACTTAC
CTGCCAGTGCCTCACGACCAACTTctgcaggaaattcctggacagctccccagatgatcagtaaccgtgggtgttatttct
ccggggccgagtgagccctgggtaggggagctctgcctcagtgctttcagctaaaaatggggtgggaaccccoCaggaag
ttcaactaccgatgcacacccgagtgctGggggaggttctctctcctcagggcccaacCccagggccccctgacctaggtccc
ggactctCactcttgaagcagtgctggcttgggtccccagtcagcaaaacttgggtccccgttgcctggaaaggagag
ggtaactgggcatcgacgacctctgcttccacgaaggcccttgaagaaaggatgggggcttctgtgcaggagaaatgag
cgcaactgaggtgaactggccctcggggGcgctgtccccagatgtgtgcaaggccctcctgatggccgcagccctcgtcc
ctgtgacccgcttggagctggcaacctgagtggtggcctcacCTTGTACTCACTCCAGGTCACTGTCTctgacGGGCC
GCTCGAcgatAAAAAAGATTTTATTAGTCTCCAGAAAAAGGGGGAATGAAGACCCACCTGTAGTTTGGCAAG
ctagctTAAGTAACCCATTTTGCAAGGCATGGMAAAATACATAAATCTGAGAATAGAGAAGTTCAGATCAAGGTCGGAACAG
ATGGAACAGGCAATAAAGAGCCCAACCCCTCACTCGGGGCGCCAGTCTCCGATTGACTGAGTCGCCCGGGTACCCG
TGATATCCAATAAACCTCTTGCAAGTTGCATCCGACTTGTGGTCTCGCTGTTCTTGGGAGGGTCTCCTCTGAGTGATTGA
CTACCCGTCAGCGGGGCTCTTTCacatgcagCATGTATCAAAATTAATTTGGTTTTTTCTTAAGTATTTACATTTAAAT
GGCCATagtttcGTAATCATGGTCATAGCTGTTTCTGTGTGAATTTGTTATCCGCTCACAAATTCACACAACATACGAG
CCGGAAGCATAAAGTGTAAGCCTGGGGTGCCTAATGAGTGAGCTAATCTCACATTAATTGCGTTGCGCTCACTGCCCGCT
TTCCAGTCGGGAAACCTGTGCGCCAGCTGCATTAATGAATCGGCCAACCGGGGAGAGGCGGTTTGCGTATTGGCGG
CTCTTCCGCTTCCCTCGCTCACTGACTCGCTGCTCGGCTCGGCTCGGCGAGCGGTATCAGCTCACTCAAAAGGCGG
TAATACGGTATCCACAGAAATCAGGGGATAACGCAGGAAGAAACAATGTGAGCAAAAGGCCAGCAAAAGGCCAGGAACCGT
AAAAAGGCCCGCTGCTGGCGTTTTCATAGGCTCCGCCCCCTGACGAGCATCACAAAAATCGACGCTCAAGTCAGAG
GTGGCGAAACCCGACAGGACTATAAAGATACCAGGCGTTTCCCCCTGGAAAGCTCCCTCGTGGCGCTCTCTGTTCGACCC

TGCCGCTTACCGGATACCTGTCCGCCCTTCTCCCTTCGGGAAGCGTGGCGCTTCTCATAGCTCAGCTGTAGGTATCTC
AGTTCGGGTAGGTCGTTTCGCTCCAAAGCTGGGCTGTGTGCACGAACCCCCCGTTAGCCCCGACCGCTGCGCCTTATCCGG
TAACATATCGTCTTGAGTCCAAACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAGAG
CGAGGTATGTAGCGGTGCTACAGAGTCTTGAAGTGGTGGCTTAACCTACGGCTACACTAGAAAGACAGTATTGGTATC
TGCCTCTGCTGAAGCCAGTTACCTTCGGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAAACCAACCGCTGGTAGCGG
TGGTTTTTTTGTTCGAAGCAGCAGATTACGCGCAGAAAAAAGGATCTCAAGAAAGATCCTTTGATCTTTTCTACGGGGT
CTGACGCTCAGTGGAAACGAAACTCACGTTAAGGATTTTGGTCACTGAGATTATCAAAAAGGATCTTCACCTAGATCCCTT
TTAAATTAAAAATGAAGTTTGGCGCAATCAATCTAAAGTATATATGAGTAAACTTGGTCTGACAGTTACCAATGCTTAAT
CAGTGAGGCACCTATCTCAGCGATCTGTCTATTTCGTTTCATCCCATAGTTGCCCTGACTCCCCGTCGTGTAGATAACTACGA
TACGGGAGGGCTTACCATCTGGCCCCAGTGTCTGCAATGATACCGCGAGACCCACGCTCACCGGCTCCAGATTATCAGCA
ATAAACCGCCAGCCGGAAGGGCCGAGCGCAGAAAGTGGTCTTGCAACTTTATCCGCCCTCCATCCAGTCTAATTTGTTG
CCGGGAAGCTAGAGTAAGTAGTTCGCCAGTTAATAGTTTGGCAACGTTGTTGCCATTGCTACAGGCATCGTGGTGTAC
GCTCGTCGTTTGGTATGGCTTCATTACGCTCCGGTTCCCAACGATCAAGGCGAGTTACATGATCCCCCATGTTGTGCAAA
AAAGCGGTAGCTCCTTCGGTCTCCGATCGTTGTCAAGAGTAAGTTGGCCGCGAGTTATCACTCATGTTATGGCAGC
ACTGCATAATTCTCTTACTGTCTATGCCATCCCGTAAGATGCTTTTCTGTGACTGGTGagtaactcaaccaagtcattctgag
aatagtgtagcggcgaccgagttgctcttggcccggtcaacacggtataataccgcgccacatagcagaactttaaaa
gtgctcatcattggaaaaagttcttcggggcgaaaaactctcaaggatcttaccgctgttgagatccagttcgatgtaacc
cactcgtgcacccaaactgactctcagcatcttttactcttcaccagcgtttctggttgagcaaaaaacagggaagcaaatg
ccgcaaaaaagggaataaggcgacacggaaaatgtgaatactcatactctctcttcttcaatattattgaagcatttat
cagggttattgtctcatgacattaaacctataaaaaataggcgt

FIG. 12D

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FIG. 13A

(2) Abhhh: Survival construct

2.) Abhhh: epsilon-cFas' (CD8 or mLy2) -Ires-Rygro-BGHPolyA also in C12s backwards

atcaagaggcccttctcgtcttcaagaacagcttctgctcttaggagttctcctaatacatcccaaacctcaaatatataaaagc
attgactgttctatgcccctagttattaatagtaaatcaattacggggtcattagttcatagcccatatattggagttcccg
cgttacataaecttacggttaaatggcccgctggctgacgcgaacgaccccgcccatggacgtcaataatgaogtatg
tcccatagtaacgcaataggagcttccattgacgtcaatgggtggagtatattacggtaaactgcccacttggcagta
catcaagtgtatcatatgccaaagtacgccccctattgacgtcaatgacggttaaatggcccgctggcattatgcccagta
catgacctatgggacttctcacttgccagtagctacatctacgtattagtcacgtattaccatggtgatcggttttggc
agtaacatcaatggcggtgtagcggtttgactcacgggatttccaaagtctccaccccatggacgtcaatgggagtttg
tttggcacccaaatcaacgggacttccaaatgtcgtacaaactccgcccccatggacgtcaatgggagtttg
acggtggaggtctataataagcagagctcaataaaagagcccaaacccctcactcggggagccagtcctcgatggatgt
gagtgcggcggtacccgtgtatccaaataaaacccctcttcaggtgcatccgacttgggtctcgtgttctcctgggaggg
tctcctctgagtattgactacccgtcagcggggtcttctcatttgggggtcgtcgggagtcgggtctcgtgttctcctgggaggg
ggacacccgacccacccggtgaggttaagctggccagcaacttattgtgtctgtccgaattgtctagtgctatgactga
ttttatgcgctcggtcggtactagtttagctaaactagctctgtatctggggacccgtgggtggaactgacgagttcggaa
cacccggcggcaacccctgggagagctcccgaggacttccggggcggttttggggccgacctgagtcgaataatcccgga
tcgttttgggactcttgggtgcaaccccttagagggaggtatgtgggtctgtgttaggagacgagaaactaaacccga
cgcctcgtctgaatttctgtatttctgtatttggtaacggaacgagccgagccggtcttctgtctgctgagcatcgttctgtgt
tgtctctgtctgactgttctgtatttctgtatttggtaacggaacgagccgagccggtcttctgtctgctgagcatcgttctgtgt
cttaggtcaactggaagatgtcgagcggtatcgctcacaacacgagtcggtagatgtcaagaagagagacgttgggttaccttct
gctctgcagaatggcccaacctttaacgtcggatggccgagacgggacactttaacgagacactcatcaccaggttaag
atcaaggctctttcacctggcccgcatggacacccagacccaggttccctacatcgtgacctgggaagccttgggttttga
ccccctcctggtcgaccccgctcgatcctcctcttatacagccctcactccttctctagggcccccactatggccat
aactcctctgataatggggcaccgcccctgttaaaacttccctgacctgacatgacaagagttactaacagccccctctct
ccaagctcaactacagggtctctacttagtccagcacgaagctctggagacctctggcgagcctacacgaacaaactctct
accgaccggtggtacctcacccttacggagtcggcgacacagtggtgggtccgacacacagactaaagaacactgag
cgctggaaaggaaccttacacagtcctgctgacaccccccacgcccctcaaatgagcggcatcgagcttggatacacgc
cgccccagtgaaaggtgccgaccccggggtggaccatcctctagactgcccggatcttcgagggtcctccccagcatgccc
TGCTATTGTCTTCCCAATCCTCCCCCTTGCTGTCTGCTGCCCCACCCACCCAGAAATAGAAATGACACCTACTCAGACAA

TGCGATGCAATTTCCCTCATTTTATTAGGAAGGACAGTGGGAGTGGCACCTTCCAGGGTCAAGGAAGGCACGGGGAGGG

GCAAAACACAGATGGCTGGCAACTAGAAGGCACAGTCGAGGCTTAGCTTGCCAAACCTACAGGTGGGTCTTTTCATTCCC

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FIG. 13C

ACCAACTTctgcaggaaattcctggacagctcccagatgatcagtaaccgtggtgttatttctgtgccgggcagtgagc
ctgggtaggggagctctgctcagtgcttctcagctaaaaatgggtgggaaccccCaggggcccggccctggaa
gtcccttctctctgttcttggaagtctgattgagcaaacagcggggtcaggtgaggtccttcaataccgatgcaca
ccgagtgctggggaggttctctctctcagggcccaacCccagggcccttgcctaggtcccggaactctCactcttgac
gcatgcgtggcttgggtgtccagtcagcaaaacttgggttcccttgcctgggaaggaggggtactgggcatcgacg
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gccccggggGcgctgtcccagatgtgtgtgcagggcctctctgatggcgcagccctgttccctgtgacccgcttgga
ctggcacccctgagtggtggcctcaactTGTACTCACTCCAGGTCACTGTCTctcgacGCCGCCGCTCGACgataAAATAA
AAGATTATTAGTCTCCAGAAAAAGGGGGGAATGAAGAACCCCACTGTAGGTTTGGCAAgctagcTTAAGTAACCCA
TTTTGCAAGGCATGGAAAAATACATAACTGAGAATAGAGAAATTTCAGATCAAGGTCGGAACAGATGGAACAGGCAATAAA
AGAGCCCAACAACCCCTCACTCGGGGGCCAGTCTCTCCGATTGACTGAGTCGCCCGGTACCCGTGTATCCCAATAAACCCCT
CTTGAGTTGCATCCGACTTGTGGTCTCTCGTGTCTTGGGAGGGTCTCCTCTGAGTGATTGACTACCCGTCAGCGGGGG
TCTTTTcaabgcagCATGTATCAAAAATTAATTGGTTTTTTTCTTAAGTATTTACATTAAATGGCCATagtttccGTAAT
CATGGTCATAGCTGTTTCCCTGTGTGAAATTTGTTATCCGCTCACAAATTCACACAACATACGAGCCGGAAGCATAAAGTGT
AAAGCCTGGGGTGCCCTAATGAGTGAGCTAACTCACTACATTAATTGCGTTGGCTCACTGCCCGCTTCCAGTCGGGAAACCT
GTGCTGCCAGCTGCATTAAATGAATCGGCCAACGCGGGGAGAGGGGTTTGCCTATTTGGGCGCTCTTCCGCTTCCCTCG
TCACTGACTCGCTCGGCTCGGTCGTTCCGCTCGGCGAGCGGTATCAGCTCACTCAAGGGGGTAATACGGTTATCCACA
GAATCAGGGGATACGCAGGAAAGAACATGTGAGCAAAAGGCCAGCAAAAGGCCAGGAACCGTAATAAAGGCCGCTTGCT
GGCGTTTTTCCATAGGCTCCGCCCCCTGACGAGCATCACAAAAATCGACGCTCAAGTCAGAGGTGGCGAACCAGACAG
GACTATAAAGATACCAGGCGTTTCCCCCTGGAAAGCTCCCCCTCGTGCGCTCTCTGTTCAGACCCCTGCCGCTTACCGGATAC
CTGTCCGCCCTTCTCCCTTCGGGAAGCGTGGCGCTTCTCATAGCTCACGCTGTAGGTATCTCAGTTCGGGTAGGTCGT
TCGCTCCAAGCTGGGCTGTGTGCACGAACCCCCGTTACGCCCGACCGCTGCGCCTTATCCGGTAACATATCGTCTTGAGT
CCAACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAGAGCGAGGTATGTAGCGGGT

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GCTACAGATTCTTGAAGTGGTGGCCTAACACGGCTACACTAGAAAGGACAGTATTGGGTATCTGCGCTCTGCTGAAGCC
AGTTACCTTCGGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAAACCAACCCGCTGGTAGCGGTGGTTTTTTGTTTGCA
AGCAGCAGATTACGCCGACAGAAAAAGGATCTCAAGAAGATCCTTTTGATCTTTTCTACGGGGTCTGACGCTCAGTGGGAAC
GAAAACTCACGTTAAGGGATTTTGGTCATGAGATTATCAAAAAGGATCTTCACCTAGATCCTTTTAAATTAAAAATGAAG
TTTGCGCAAAATCAATCTAAAGTATATATGAGTAAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCT
CAGCGATCTGTCTATTTTCGTTTCATCCATAGTTGCCTGACTCCCCCGTGTGTAGATAACTACGATACGGGAGGGCTTACCA
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CGGTCCCTCCGATCGTTGTCAAGAAAGTAAAGTTGGCCGAGTGTATCACTCATGTTATGGCAGCAGTGCATAATTCTCTTA
CTGTCATGCCATCCGTAAGATGCTTTTCTGTGACTGGTGagtaactcaaccaagtcattctgagaaatagtgatgcggcga
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gatcttcagcatctttactcttcacagcggttctggtgagcaaaaaacgggaaggcaaaatgcgcgaaaaaagggaata
agggcgacacgggaaatgttgatactcatactctctctcttttcaaatattattgaagcatttatcagggttattgtctcat
gacattaacctataaaaaataggcgt

FIG._13D